



NTH Consultants, Ltd.
Infrastructure Engineering
and Environmental Services



Title:

Large CAFOs

Engineering to Protect Waters of the State

Presented by:

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Livestock Agriculture



- Dairy Farms
- Beef Farms
- Swine
- Poultry

Source: Halbert Dairy, Michigan

Livestock Agriculture

- Large CAFOs = Big Farms

- House Farm Animals

- Animals Pooh



What's Wrong with Pooh?

- Nutrients
- BOD
- TSS
- Bacteria



Source: Masselink Dairy, Michigan



- Michigan regulations protect against discharge of manure or polluted storm water into waters of the state.
- Waters of the state include: *surface water and groundwater*.
- Surface Water – **NPDES Permits**
- Ground Water – Permits for farms **>5000 animal units, egg wash water**

Animal Waste Management

- Production
- Transfer
- Storage
- Treatment
- Utilization



Source: Burdock Hill Dairy, Michigan

What needs “Engineering”?

- Engineered Systems
 - Transfer
 - Treatment
 - Storage



Source: Burdock Hill Dairy, Michigan



Storage



Source: Halbert Dairy, Michigan

Storage

- Investigation & Evaluation
- Drawings & Specifications
- Construction Observation



Source: Schaendorf Dairy, Michigan

Storage: Minimal Requirements

- Capacity
- Design Storm
- Water Well Isolation
- Groundwater Isolation
- Specific Discharge



Source: Schaendorf Dairy, Michigan

Treatment



Source: Burdock Hill Dairy, Michigan

- Improve farm efficiencies
- Value-added byproducts
- Improve ground and surface water quality
- Improve air quality

Treatment

Solid Removal

- Mechanical
- Passive - Gravity
- Chemical

Reduction of Volatile Solids

- Biological
 - Anaerobic systems
 - Lagoon
 - Digesters
 - Vegetated filter strips



Source: Envirolytic Technologies

Utilization



Source: Burdock Hill Dairy, Michigan

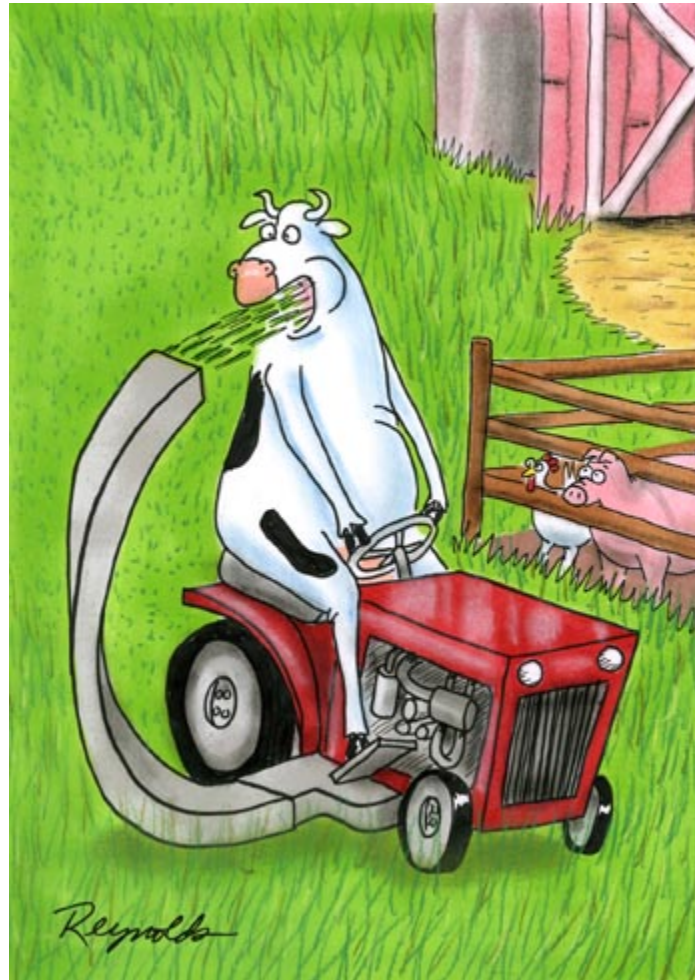


Available Technology

- USDA-NRCS Animal Waste Management (AWM), Version 2.2.1
- Purdue Manure Management Planner (MMP) Version 0.23



Questions



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